R E P O R T R E S U M E S

ED 012 754 VT 000 413

MECHANICAL COMPETENCIES NEEDED FOR EMPLOYMENT IN FARM MACHINERY SALES AND SERVICE, AND FARM SUPPLIES AND EQUIPMENT BUSINESSES.

BY- GENTRY, GENE A.
MARYLAND UNIV., COLLEGE PARK

PUB DATE FEB 66

EDRS PRICE MF-$0.25 HC-$0.60 15P.

DESCRIPTORS- *VOCATIONAL AGRICULTURE, *OFF FARM AGRICULTURAL OCCUPATIONS, *EDUCATIONAL NEEDS, FARMERS, AGRICULTURAL MACHINERY OCCUPATIONS, SALES OCCUPATIONS, SERVICE OCCUPATIONS, *MECHANICAL SKILLS, MARYLAND, COLLEGE PARK

OBJECTIVES WERE TO DETERMINE--(1) THE MECHANICAL COMPETENCIES AND UNDERSTANDINGS NEEDED BY EMPLOYEES IN TWO OFF-FARM AGRICULTURAL OCCUPATIONS, AND (2) THE DIFFERENCES BETWEEN COMPETENCIES NEEDED BY THESE EMPLOYEES AND SUCCESSFUL FARMERS. DAVID TUGEND'S SURVEY INSTRUMENT WAS THE BASIS FOR AN INSTRUMENT USED TO INTERVIEW RANDOM SAMPLES OF 25 BUSINESSES SELECTED FROM EACH OF THE TWO AGRICULTURAL OCCUPATIONAL GROUPS IN FIVE MARYLAND COUNTIES (99 FARM SUPPLIES AND EQUIPMENT BUSINESSES AND 66 FARM SALES AND SERVICE BUSINESSES). EMPLOYERS WERE ASKED TO EVALUATE THE NEED FOR 104 MECHANICAL COMPETENCIES BY SALES, SKILLED, AND SEMISKILLED EMPLOYEES. OF THE 72 COMPETENCIES NEEDED, 34 WERE IN FARM POWER AND MACHINERY, AND 30 WERE IN FARM SHOP WORK. RECOMMENDATIONS BASED ON THIS STUDY WERE--(1) PUPILS WHO INTEND TO ENTER FARM MACHINERY SALES AND SERVICE BUSINESSES SHOULD BE GIVEN EXTENSIVE TRAINING IN FARM POWER AND MACHINERY AND FARM SHOP WORK, ESPECIALLY IN THE AREAS OF WELDING AND METAL WORK, (2) FARM SHOP PROGRAMS FOR TRAINING PUPILS SHOULD BE DESIGNED TO TRAIN FOR AN OCCUPATIONAL GROUP RATHER THAN A LEVEL OF EMPLOYMENT, AND (3) PUPILS PLANNING TO ENTER FARMING OR FARM MACHINERY SALES AND SERVICE BUSINESSES SHOULD RECEIVE MECHANICAL TRAINING IN THE SAME CLASSES. THE 119 SKILLS OR COMPETENCIES IDENTIFIED FOR THIS STUDY WERE RANKED AND COMPARED WITH NEEDS IDENTIFIED IN A 1963 STUDY OF SUCCESSFUL FARMERS IN MARYLAND. (PS)

ED012754

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

MECHANICAL COMPETENCIES NEEDED FOR EMPLOYMENT IN FARM MACHINERY SALES AND SERVICE AND FARM SUPPLIES AND EQUIPMENT BUSINESSES

by

Gene A. Gentry

Department of Agricultural and Extension Education

University of Maryland

College Park, Maryland

February 1966

VT000413

FOREWORD

In this study, the author was concerned essentially with a problem facing teachers of vocational agriculture, particularly those in one-teacher departments, who are attempting to introduce preparation for off-farm agricultural occupations into their programs and at the same time continue instruction in production agriculture. Must students preparing for employment in farm machinery sales and service, and farm supplies and equipment businesses be taught mechanical skills that are greatly different from those taught students preparing for work in production agriculture? Are the mechanical skills required of these groups the same, and if not, are they sufficiently alike to permit teaching all students in a single mechanics class?

The sample studied was in five counties in Maryland. However, the businesses involved are probably similar in character to other farm machinery sales and service, and farm supplies and equipment businesses throughout much of the rest of the country. It is not unlikely, then, that the findings of this will be applicable for the same problem in other areas of the United States.

The table in this publication will not likely be of interest to the casual reader. However, teachers who are interested in solving the problem faced in this study for themselves should find the data in this table useful.

V. R. Cardozier, Head
Department of Agricultural and
Extension Education

MECHANICAL COMPETENCIES NEEDED FOR EMPLOYMENT IN FARM MACHINERY SALES AND SERVICE AND FARM SUPPLIES AND EQUIPMENT BUSINESSES

Gene A. Gentry*

Prior to the passage of Public Law 88-210 in 1963, teachers of vocational agriculture were limited by law to training students to make a beginning and advance in farming. Public Law 88-210 changed this to permit training for gainful employment in agricultural occupations other than farming.

It became apparent that if instruction was to extend effectively into new occupational areas, it was necessary to determine what changes needed to be made in course offerings. Many states conducted studies to determine employment opportunities while others investigated such broad areas as leadership, crops, and livestock. This study was conducted to determine the mechanical competencies (skills) needed by employees in two off-farm agricultural occupations, with a view toward providing a basis for modifying some of the mechanical training offered in agricultural departments in some high schools.

Objectives. The objectives of the study were:

1. To determine the mechanical competencies and understandings needed for employment in farm machinery sales and service, and farm supplies and equipment businesses.

2. To determine differences between competencies needed by successful farmers and competencies needed by employees in farm machinery sales and service occupations, and farm supplies and equipment occupations.

---

*Teacher of Vocational Agriculture, Palouse High School, Palouse, Washington; formerly graduate assistant, Department of Agricultural and Extension Education, University of Maryland.

3. To compare the mechanical competencies needed by employees in farm machinery sales and service with the mechanical competencies needed by employees in farm supplies and equipment businesses.

4. To determine the importance of the mechanical competencies required by each skill level -- sales, skilled, and semi-skilled -- in farm machinery sales and service and farm supplies and equipment occupations.

5. To determine the differences between competencies needed by sales, skilled, and semi-skilled levels of employment in farm machinery sales and service, and farm supplies and equipment businesses.

Procedure. Selected employers in two off-farm agricultural occupational groups were interviewed. The two groups were farm machinery sales and service, and farm supplies and equipment. Farm machinery sales and service businesses were those businesses which sold farm machinery and tractors and which did approximately one-half or more of their business with farmers. Farm supplies and equipment businesses conducted one-half or more of their business with farmers and sold such materials as feed, seed, fertilizer, dairy equipment, hardware, and other farm supplies.

Sample. Businesses in the two agricultural groups were identified from the yellow pages of the telephone directory covering five counties in Maryland: Prince Georges, Montgomery, Anne Arundel, Howard, and Baltimore. There were 99 farm supplies and equipment businesses and 66 farm sales and service businesses. The five counties, located in the Piedmont Plateau and Southern regions of Maryland, were selected because they contained considerable production agriculture yet were being influenced by the population expansion which is turning farm land to other uses and preventing many youths from returning to the farm. Many of these students, if they remain in agriculture, will of necessity have to enter some of the businesses under consideration.

Random samples of 25 businesses were selected from each of the two agricultural occupational groups. A total of 54 employers was interviewed, four of which were eliminated because of the nature of the business.

Instrument for Collecting Data. The survey instrument was derived from one by Tugend.[1] Tugend's instrument was selected to provide the base because it had been used on a Maryland farm population and contained mechanical competencies used by Maryland farmers. Since the study was intended to determine in what respects changes should be made in the existing vocational agriculture program in order to provide mechanical training for those preparing for non-farm agricultural occupations, a base consisting of offerings for those preparing for farming seemed to be appropriate. Competencies were deleted which appeared to be of little use in off-farm agricultural occupations in Maryland and other competencies added which appeared useful.

The instrument was pre-tested on six employers in the two occupational groups. These employers were not included in the samples. After each pre-test interview the instrument was further refined. Early in the collection of data three additional competencies were added because several employers mentioned employee need of these competencies. The findings of Tugend's study were assumed to be a basis of validation for mechanical competencies needed by farmers.

Quantification of Ratings. Employers were asked to evaluate the need of 104 mechanical competencies by sales, skilled, and semi-skilled employees. The classifications of need were: very desirable, helpful, and of little use.

---

[1]David M. Tugend, "Comparative Study of Selected Farm Mechanical Skills Performed by Successful Maryland Farm Operators and Farm Mechanical Skills Taught in Vocational Agriculture in Certain Maryland High Schools" (unpublished Master's thesis, University of Maryland, College Park, 1964).

A value of two was assigned to a rating of very desirable, one to a rating of helpful, and zero to a rating of little use. Using the assigned values, mean scores were calculated for each competency. Competencies which received mean scores of 1.5 or above were considered very desirable, 0.50 to 1.49 as helpful, and 0.00 to 0.49 as of little use. Only competencies receiving mean scores above 0.50 were considered as needed by employees in off-farm agricultural occupations.

Competencies were ranked according to the mean score received. The highest mean score for each business or level of employment received a ranking of 1.00. Other competencies received subsequent ranks with equal mean scores receiving rankings of equal value.

Findings and Conclusions

Seventy-two of the 104 competencies used in this study were needed by employees in farm machinery sales and service. Need was defined as a rating of very desirable or helpful. Thirty-four of these competencies were in farm power and machinery and 30 were in farm shop work.

Farm power and machinery competencies needed by employees in farm sales and service occupations were:

- flush cooling system with a commercial radiator cleaner
- adjust tractor carburetors
- service the fuel injection system
- adjust engine timing
- adjust clutch pedal clearance
- clean oil pump screen
- adjust a carburetor on a small internal combustion engine
- basic hydraulics
- repair tires on farm machinery
- service air cleaner
- clean and regap spark plugs
- replace points
- service the diesel fuel injection filter
- adjust valve tappets
- adjust tractor brakes
- replace head gasket
- lubricate tractor
- overhaul a small engine
- trouble shoot
- service transmission and final drive
- order parts by use of manual code number

- replace bearings
- repair and sharpen a field mower knife
- hitch plows for vertical and horizontal correctness
- adjust combine for harvesting losses
- adjust baler for proper operation
- care of machinery
- paint machinery with a power sprayer
- register the knife of a field mower
- calibrate a grain drill
- calibrate a field sprayer
- adjust combine for proper running speed
- assemble machinery

Farm shop skills needed by employees in farm machinery sales and service occupations were:

- sharpen a twist bit
- operate a power grinder
- dress grinder wheels
- select grinder wheels for the job
- cut threads on steel rod
- rivet sheet metal
- tin soldering iron
- sharpen forage cutter knives on harvesting machines
- prepare metals for electrical arc welding
- cut metal with the arc welder
- use the carbon arc torch for welding
- braze cast irons with oxyacetylene welder
- hard surface with oxyacetylene welder
- weld with a heli-arc welder
- cut glass to a desired shape
- fit handles in hand tools
- wear protective glasses while grinding
- use a portable electric drill for drilling holes in steel
- cut metal with a hacksaw
- sweat a patch with solder
- shape and bend hot metal
- temper a chisel
- operate a lathe
- select proper rods for the type of metal to be welded
- make a lap, butt or corner weld on iron or steel
- operate an oxyacetylene cutting torch
- build up worn parts
- weld pipe
- thread galvanized iron pipe
- assemble pipe

Other competencies needed by employees in farm machinery sales and service were:

- care of tools
- operate hammer mill and mix feeds
- design and maintain an efficient tool storage

- repair a damaged appliance cord
- determine purpose and select wire size
- replace and putty a window pane
- make a common electrical splice
- make a connection to a lighting fixture

Twelve of the 104 competencies were needed by employees in farm supplies and equipment occupations. Each of the twelve competencies was rated helpful. They were:

- care of tools
- care of machinery
- apply paint after using a primer
- repair a damaged appliance cord
- lubricate tractor
- make a common electrical splice
- assemble pipe
- operate a hammer mill and mix feeds
- replace and putty a window pane
- use wood preservatives on outdoor buildings
- cut glass to a desired shape
- repair tires on farm machinery

The table on the following pages shows relative rankings of competencies for each level of employment in both farm machinery sales and service, and farm supplies and equipment businesses and for successful farmers. Rankings for successful farmers were taken from Tugend's study.[2]

Competencies with a rank between 1 and 29 in column (2), between 1 and 84 in column (3), and between 1 and 65 in column (4) received a mean rating of helpful or very desirable. In column (5) helpful or very desirable ratings received a rank between 1 and 4, in column (6) between 1 and 73, and in column (7) between 1 and 16. Rankings below those indicated for each level were "of little use".

Recommendations. Recommendations based on the conclusions of this study are:

1. That a pupil who intends to enter farm machinery sales and service businesses be given extensive training in farm power and machinery and farm

---

[2] Op. cit., pp. 67-71.

shop work, especially in the areas of welding and metal work.

2. That, insofar as possible, farm shop programs be tailored to include competencies needed by pupils who are contemplating employment in a given agricultural occupational group.

3. That a farm shop program for training pupils to enter off-farm agricultural occupations be designed to train for an occupational group rather than a level of employment.

4. That emphasis be given to care of tools and care of machinery in the farm mechanics instructional program.

5. That pupils planning to enter farming and those planning to enter farm machinery sales and service businesses receive mechanical training in the same classes.

For additional information about this study, the full report may be obtained through inter-library loan from the University of Maryland library:

Gentry, Gene A. "Mechanical Competencies Needed for Employment in Farm Machinery Sales and Service and Farm Supplies and Equipment Businesses in Five Maryland Counties," M.S. Thesis, University of Maryland, 1966.

RANK OF AGRICULTURAL MECHANICAL SKILLS AND COMPETENCIES NEEDED BY SALES, SKILLED, AND SEMI-SKILLED WORKERS IN FARM MACHINERY SALES AND SERVICE OCCUPATIONS AND IN FARM SUPPLIES AND EQUIPMENT BUSINESSES IN FIVE MARYLAND COUNTIES, 1965, COMPARED WITH RANK OF NEED BY SUCCESSFUL FARMERS IN MARYLAND, 1963

Skill or competency	Ranking by successful farmers* (1)	Employee need, as ranked by farm machinery sales and service employers**			Employee need, as ranked by farm supplies and equipment business employers***		
		Sales (2)	Skilled (3)	Semi-skilled (4)	Sales (5)	Skilled (6)	Semi-skilled (7)
1. Fit handles in hand tools	1.00	81.50	63.50	28.50	42.50	19.00	16.00
2. Repair a damaged appliance cord	2.50	50.50	68.00	65.00	9.00	3.00	16.00
3. Cut metal using a hacksaw	2.50	40.00	53.50	18.50	53.00	32.00	10.00
4. Replace and putty a window pane	4.00	50.50	72.50	47.00	16.50	5.00	2.50
5. Operate a power circular hand saw	5.00	56.50	81.00	68.00	23.00	19.00	26.50
6. Service the air cleaner	6.50	6.50	22.50	10.00	90.50	10.50	26.50
7. Use a portable drill for drilling holes in steel	6.50	25.50	38.00	10.00	53.00	19.00	10.00
8. Hang farm gates	8.50	-----	-----	-----	-----	-----	-----
9. Repair a field mower knife	8.50	40.00	43.00	7.00	90.50	85.00	60.50
10. Adjust tractor brakes	10.50	18.00	8.00	12.50	70.50	32.00	60.50
11. Operate a power grinder	10.50	66.50	34.00	16.00	42.50	19.00	16.00
12. Lubricate front wheel bearings	12.00	9.50	22.50	3.00	12.00	8.50	21.50
13. Order parts by use of manual code number	13.50	3.50	34.00	24.50	9.00	54.50	88.50
14. Hitch plows for vertical and horizontal correctness	13.50	5.00	22.50	31.00	42.50	91.00	80.50
15. Repair metal roofing	15.50	90.00	100.00	91.00	42.50	54.50	39.00
16. Thread galvanized iron pipe	15.50	61.00	65.50	36.00	23.00	54.50	5.00
17. Apply paint after using a primer	17.50	45.50	83.00	70.50	4.00	6.50	5.00
18. Adjust carburetor on a small internal combustion engine	17.50	18.00	8.00	21.00	90.50	63.50	80.50
19. Make a connection to a lighting fixture	19.00	50.50	76.00	70.50	42.50	54.50	32.00
20. Hook up an electrical fence	20.00	-----	-----	-----	-----	-----	-----
21. Construct a piece of equipment according to own design	22.00	-----	-----	-----	-----	-----	-----
22. Clean and regap spark plugs	22.00	28.00	17.50	8.00	90.50	32.00	26.50
23. Splice woven fire fence	22.00	-----	-----	-----	-----	-----	-----
24. Finish or trowel concrete	24.00	99.00	103.00	100.50	90.50	73.00	32.00
25. Build concrete forms	26.00	99.00	103.00	100.50	30.00	43.50	21.50
26. Adjust the carburetor of tractor	26.00	14.50	22.50	21.00	90.50	32.00	33.00
27. Repair tires on farm machinery	26.00	56.50	58.50	4.50	12.00	43.50	10.00
28. Make a common electrical splice	28.50	50.50	68.00	65.00	16.50	6.50	21.50
29. Register the knife of a field mower	28.50	11.50	27.50	16.00	70.50	91.00	60.50
30. Make an estimated bill of materials for small construction	30.00	66.50	103.00	104.00	12.00	85.00	80.50
31. Adjust clutch pedal clearance	31.00	21.50	8.00	16.00	70.50	32.00	60.50
32. Replace bearings	32.50	50.50	17.50	32.50	70.50	43.50	72.50
33. Sharpen a wood twist bit	32.50	82.50	49.50	36.00	42.50	43.50	39.00

TABLE (continued)

Skill or competency	Ranking by successful farmers* (1)	Employee need, as ranked by farm machinery sales and service employers**			Employee need, as ranked by farm supplies and equipment business employers***		
		Sales (2)	Skilled (3)	Semi-skilled (4)	Sales (5)	Skilled (6)	Semi-skilled (7)
34. Cut threads on steel rod	34.00	34.00	48.00	12.50	53.00	43.50	21.50
35. Estimate the quantity of concrete needed for a job	35.50	-----	-----	-----	-----	-----	-----
36. Use wood preservatives on outdoor buildings	35.50	56.50	88.00	86.00	4.00	8.50	16.00
37. Measure and cut plastic pipe	37.00	-----	-----	-----	-----	-----	-----
38. Clean oil pump screen	38.50	50.50	27.50	21.00	100.50	63.50	65.50
39. Lay out foundation lines	38.50	-----	-----	-----	-----	-----	-----
40. Replace distributor points	40.50	25.50	8.00	14.00	90.50	32.00	60.50
41. Mix concrete	40.50	-----	-----	-----	-----	-----	-----
42. Calibrate a field sprayer	42.00	3.50	34.00	28.50	1.50	80.50	53.00
43. Sharpen forage harvester cutter knives	43.00	74.00	46.50	24.50	90.50	80.50	53.00
44. Wire a two-way switch	44.50	-----	-----	-----	-----	-----	-----
45. Lay masonry blocks or bricks	44.50	-----	-----	-----	-----	-----	-----
46. Tin a soldering iron	47.00	82.50	49.50	51.00	70.50	32.00	10.00
47. Cut glass to a desired shape	47.00	61.00	72.50	51.00	16.50	10.50	10.00
48. Select grinder wheels for the job	47.00	74.00	43.00	28.50	42.50	43.50	39.00
49. Repair building foundations	49.00	-----	-----	-----	-----	-----	-----
50. Select equipment according to the U. L. approved label	50.00	21.50	81.00	84.00	53.00	73.00	72.50
51. Make a short rope splice	51.00	-----	-----	-----	-----	-----	-----
52. Replace engine head gasket	52.50	40.00	8.00	32.50	100.50	73.00	72.50
53. Install insulating materials	52.50	90.00	100.00	91.00	53.00	73.00	39.00
54. Draw a map of the farm and plan a suitable cropping system	56.00	30.50	90.50	91.00	16.50	98.00	102.50
55. Reverse the direction of turn in an electrical motor	56.00	74.00	72.50	76.50	30.00	54.50	65.50
56. Design and maintain an efficient tool storage system	56.00	34.00	55.00	28.50	70.50	54.50	21.50
57. Water-proof concrete or block walls	56.00	99.00	100.00	95.50	30.00	63.50	32.00
58. Sweat a patch with solder	56.00	82.50	51.50	47.00	70.50	32.00	21.50
59. Adjust the combine for proper running speed	59.00	11.50	8.00	44.00	42.50	91.00	88.50
60. Clean and set a hand saw	60.50	74.00	79.00	68.00	70.50	54.50	26.50
61. Flush the cooling system with a commercial radiator cleaner	60.50	25.50	8.00	18.50	70.50	43.50	32.00
62. Wear protective glasses while grinding	62.00	13.00	43.00	10.00	23.00	19.00	16.00
63. Adjust engine valve tappets	63.00	34.00	8.00	40.50	70.50	32.00	88.50
64. Select an electrical motor according to working conditions	64.00	18.00	81.00	86.00	30.00	63.50	72.50
65. Change a motor from 110 to 220 volts by changing the wiring hookup	65.00	66.50	68.00	79.50	53.00	54.50	72.50
66. Rivet sheet metal	66.00	82.50	61.50	36.00	42.50	32.00	10.00
67. Calibrate a grain drill	67.00	2.00	34.00	26.00	1.50	80.50	72.50
68. Prepare metals for electrical arc welding	69.00	99.00	30.50	56.50	70.50	19.00	45.50
69. Adjust engine ignition timing	69.00	40.00	8.00	40.50	70.50	63.50	88.50

TABLE (continued)

Skill or competency	Ranking by successful farmers* (1)	Employee need, as ranked by farm machinery sales and service employers**			Employee need, as ranked by farm supplies and equipment business employers***		
		Sales (2)	Skilled (3)	Semi-skilled (4)	Sales (5)	Skilled (6)	Semi-skilled (7)
70. Establish a farm shop	69.00	-----	-----	-----	-----	-----	-----
71. Dress grinder wheels	72.00	82.50	38.00	23.00	70.50	43.50	39.00
72. Select the proper rods for electrical arc welding	72.00	90.00	27.50	56.50	70.50	19.00	39.00
73. Cut a piece of metal with the arc welder	72.00	90.00	34.00	56.50	70.50	19.00	39.00
74. Determine purpose and select wire sizes according to code	74.50	34.00	77.00	73.00	42.50	43.50	60.50
75. Make a lap, butt or corner weld on iron or steel	74.50	99.00	38.00	61.50	70.50	19.00	45.50
76. Measure fields to determine acreage	76.50	30.50	86.50	61.00	16.50	98.00	97.50
77. Adjust tractor governor	76.50	45.50	8.00	40.50	100.50	63.50	80.50
78. Clean and service a used electrical motor	79.00	74.00	72.50	73.00	53.00	43.50	65.50
79. Paint machinery with a power sprayer	79.00	56.50	53.50	6.00	100.50	80.50	32.00
80. Measure combine harvesting losses	79.00	8.00	8.00	47.00	42.50	91.00	88.50
81. Construct a portable building according to a blueprint	81.00	66.50	90.50	100.50	30.00	54.50	53.00
82. Construct a simple terrace	82.00	40.00	93.50	100.50	70.50	98.00	80.50
83. Install a bulk fertilizer handling system	84.00	66.50	86.50	100.50	9.00	73.00	45.50
84. Correct defects in a drainage system	84.00	74.00	97.50	100.50	30.00	98.00	97.50
85. Use a carbon arc torch for welding	84.00	90.00	43.00	56.50	70.50	19.00	53.00
86. Estimate the cost of an irrigation system	86.00	40.00	90.50	91.00	70.50	104.00	102.50
87. Plan a building fire control program	87.00	66.50	97.50	95.50	70.50	91.00	88.50
88. Construct an outlet for field tile	89.50	-----	-----	-----	-----	-----	-----
89. Service the diesel-fuel-injection filters	89.50	25.50	8.00	36.00	100.50	63.50	97.50
90. Operate an oxyacetylene cutting torch	89.50	82.50	27.50	53.50	70.50	19.00	32.00
91. Hard surface with oxyacetylene welder using the proper rod	89.50	99.00	56.00	65.00	70.50	63.50	53.00
92. Correct defects in an irrigation system	93.00	40.00	85.00	81.00	42.50	102.50	97.50
93. Use wood glue for outside construction	93.00	90.00	95.50	88.00	30.00	91.00	72.50
94. Braze cast irons with the oxyacetylene welder	93.00	90.00	30.50	61.50	70.50	19.00	60.50
95. Install overload protective devices	95.00	61.00	75.00	76.50	23.00	43.50	45.50
96. Construct a farm pond	96.50	56.50	93.50	95.50	70.50	102.50	97.50
97. Install a feed or grain auger system	96.50	34.00	78.00	76.50	4.00	19.00	72.50
98. Estimate the cost of a drainage system	98.00	56.50	90.50	91.00	70.50	101.00	102.50
99. Determine proper size of field tile	99.50	74.00	95.50	95.50	30.00	98.00	102.50
100. Plan a farm wiring system	99.50	-----	-----	-----	-----	-----	-----
101. Care of machinery	-----	1.00	8.00	4.50	6.50	4.00	10.00
102. Care of tools	-----	9.50	17.50	2.00	6.50	2.00	1.00
103. Service fuel injection system	-----	29.00	40.00	83.00	100.50	68.00	93.50
104. Overhaul a small engine	-----	45.50	22.50	40.50	100.50	73.00	88.50
105. Trouble shoot	-----	18.00	17.50	36.00	42.50	19.00	80.50

TABLE (continued)

Skill or competency	Ranking by successful farmers* (1)	Employee need, as ranked by farm machinery sales and service employers**			Employee need, as ranked by farm supplies and equipment business employers***		
		Sales (2)	Skilled (3)	Semi-skilled (4)	Sales (5)	Skilled (6)	Semi-skilled (7)
106. Service transmission and final drive	-----	66.50	22.50	53.50	100.50	73.00	97.50
107. Basic hydraulics	-----	23.00	8.00	43.00	30.00	78.00	84.00
108. Adjust baler for proper operation	-----	6.50	8.00	47.00	42.50	91.00	88.50
109. Assemble machinery	-----	18.00	46.50	1.00	30.00	73.00	32.00
110. Shape and bend hot metal	-----	82.50	57.00	47.00	90.50	73.00	53.00
111. Temper a chisel	-----	90.00	63.50	68.00	90.50	85.00	45.50
112. Anneal metal	-----	99.00	65.50	76.50	90.50	85.00	45.50
113. Lathe operation	-----	90.00	60.00	73.00	90.50	85.00	65.50
114. Build up worn parts	-----	99.00	43.00	59.00	70.50	43.50	53.00
115. Weld pipe	-----	99.00	51.50	61.50	70.50	19.00	53.00
116. Weld with a heli-arc welder	-----	104.00	58.50	79.50	70.50	54.50	72.50
117. Assemble pipe	-----	66.50	70.00	51.00	23.00	32.00	5.00
118. Operate hammer mill and mix feeds	-----	14.50	61.50	61.50	16.50	1.00	2.50
119. Install and operate dairy equipment	-----	45.50	84.00	82.00	20.00	95.00	93.50

*David M. Tugend, "Comparative Study of Selected Farm Mechanical Skills Performed by Successful Maryland Farm Operators and Farm Mechanical Skills Taught in Vocational Agriculture in Certain Maryland High Schools" (unpublished Master's thesis, University of Maryland, College Park, 1964), pp. 67-71.

**Competencies with a rank higher than 29.00 in sales (2), 84.00 in skilled (3), and 65.00 in semi-skilled (4) levels of employment have a rating of helpful or very desirable.

***Competencies with a rank higher than 4.00 in sales (5), 73.00 in skilled (6), and 16.00 in semi-skilled (7) levels of employment have a rating of helpful.